

ABSTRACT

Overview of NASA's Carbon Monitoring System Flux-Pilot Project

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NASA's space-based observations of physical, chemical and biological parameters in the Earth System along with state-of-the-art modeling capabilities provide unique capabilities for analyses of the carbon cycle. The Carbon Monitoring System is developing an exploratory framework for detecting carbon in the environment and its changes, with a view towards contributing to national and international monitoring activities. The Flux-Pilot Project aims to provide a unified view of land-atmosphere and ocean-atmosphere carbon exchange, using observation-constrained models. Central to the project is the application of NASA's satellite observations (especially MODIS), the ACOS retrievals of the JAXA-GOSAT observations, and the "MERRA" meteorological reanalysis produced with GEOS-5. With a primary objective of estimating uncertainty in computed fluxes, two land- and two ocean-systems are run for 2009-2010 and compared with existing flux estimates.

An transport model is used to evaluate simulated CO₂ concentrations with in-situ and space-based observations, in order to assess the realism of the fluxes and how uncertainties in fluxes propagate into atmospheric concentrations that can be more readily evaluated. Finally, the atmospheric partial CO₂ columns observed from space are inverted to give new estimates of surface fluxes, which are evaluated using the bottom-up estimates and independent datasets. The focus of this presentation will be on the science goals and current achievements of the pilot project, with emphasis on how policy-relevant questions help focus the scientific direction. Examples include the issue of what spatio-temporal resolution of fluxes can be detected from polar-orbiting satellites and whether it is possible to use space-based observations to separate contributions to atmospheric concentrations of (say) fossil-fuel and biological activity.